



Hans Koenigsmann

Vice President for Flight Reliability, SpaceX

1
00:00:05,349 --> 00:00:03,669
d minus ten

2
00:00:06,230 --> 00:00:05,359
nine eight

3
00:00:07,190 --> 00:00:06,240
seven

4
00:00:08,150 --> 00:00:07,200
six

5
00:00:09,110 --> 00:00:08,160
five

6
00:00:10,230 --> 00:00:09,120
four

7
00:00:11,190 --> 00:00:10,240
three

8
00:00:11,990 --> 00:00:11,200
two

9
00:00:14,629 --> 00:00:12,000
one

10
00:00:17,830 --> 00:00:14,639
engine engine ignition

11
00:00:19,510 --> 00:00:17,840
liftoff of the falcon 9 rocket with

12
00:00:38,950 --> 00:00:19,520
science for today

13
00:00:38,960 --> 00:00:49,830

history

14

00:00:54,229 --> 00:00:51,830

good evening everyone this is the

15

00:00:55,590 --> 00:00:54,239

post-launch news conference

16

00:00:58,549 --> 00:00:55,600

for our

17

00:01:00,549 --> 00:00:58,559

spacex

18

00:01:02,389 --> 00:01:00,559

zrs acrs8

19

00:01:05,109 --> 00:01:02,399

mission tonight

20

00:01:06,469 --> 00:01:05,119

and here to join us to give us a status

21

00:01:08,710 --> 00:01:06,479

on our

22

00:01:10,789 --> 00:01:08,720

launch and our mission

23

00:01:12,950 --> 00:01:10,799

is kirk sharman manager for the

24

00:01:16,550 --> 00:01:12,960

international space station program at

25

00:01:19,030 --> 00:01:16,560

nasa's johnson space center

26

00:01:21,350 --> 00:01:19,040

elon musk the spacex

27

00:01:23,429 --> 00:01:21,360

chief executive officer and lead

28

00:01:24,550 --> 00:01:23,439

designer

29

00:01:26,469 --> 00:01:24,560

and

30

00:01:29,030 --> 00:01:26,479

hans koenigsmann the vice president of

31

00:01:31,429 --> 00:01:29,040

flight reliability for spacex and we'll

32

00:01:33,270 --> 00:01:31,439

start first with kirk shineman kirk all

33

00:01:35,030 --> 00:01:33,280

right thanks uh what a wonderful day

34

00:01:37,510 --> 00:01:35,040

it's beautiful day outside a great day

35

00:01:40,469 --> 00:01:37,520

to launch a rocket and and we saw a

36

00:01:42,230 --> 00:01:40,479

great one so uh i had the the pleasure

37

00:01:44,710 --> 00:01:42,240

of being in the mission control center

38

00:01:47,510 --> 00:01:44,720

at spacex and and i can tell you the

39

00:01:49,190 --> 00:01:47,520

folks were really excited as were myself

40

00:01:50,310 --> 00:01:49,200

and bill gerstenmaier

41

00:01:51,670 --> 00:01:50,320

um

42

00:01:54,710 --> 00:01:51,680

and and then we could hear the roar of

43

00:01:56,149 --> 00:01:54,720

the rocket that was really cool so after

44

00:01:57,910 --> 00:01:56,159

after the launch i got on the phone and

45

00:01:59,510 --> 00:01:57,920

talked to our colleagues in houston and

46

00:02:01,429 --> 00:01:59,520

there was a roar there too so it was

47

00:02:02,389 --> 00:02:01,439

great to hear that we're very excited to

48

00:02:05,190 --> 00:02:02,399

have

49

00:02:07,190 --> 00:02:05,200

our our cargo and the dragon safely on

50

00:02:10,710 --> 00:02:07,200

orbit and we're very much looking

51
00:02:12,150 --> 00:02:10,720
forward to it to arrive to uh to the iss

52
00:02:13,990 --> 00:02:12,160
um i had a chance to speak to our

53
00:02:15,750 --> 00:02:14,000
mission control room in houston and all

54
00:02:18,229 --> 00:02:15,760
systems on board the iss are ready to

55
00:02:20,229 --> 00:02:18,239
support uh the mission

56
00:02:22,070 --> 00:02:20,239
and like i said we're looking great uh

57
00:02:25,990 --> 00:02:22,080
very forward to having the cargo and all

58
00:02:29,430 --> 00:02:26,000
the utilization on board iss

59
00:02:32,550 --> 00:02:29,440
tim peake will be grappling the dragon

60
00:02:34,550 --> 00:02:32,560
at 6 12 a.m sunday central time

61
00:02:35,589 --> 00:02:34,560
and jeff williams will be assisting him

62
00:02:37,110 --> 00:02:35,599
and those

63
00:02:38,470 --> 00:02:37,120

those crew members are ready to support

64

00:02:40,630 --> 00:02:38,480

that operation

65

00:02:41,430 --> 00:02:40,640

and and like i said we're really happy

66

00:02:43,030 --> 00:02:41,440

to have

67

00:02:45,430 --> 00:02:43,040

have dragging up in space and we'll be

68

00:02:47,190 --> 00:02:45,440

even more happy to have it on board iss

69

00:02:49,270 --> 00:02:47,200

so let me hand it back to you and we'll

70

00:02:51,509 --> 00:02:49,280

hear from our spacex colleagues all

71

00:02:54,150 --> 00:02:51,519

right thank you kirk now to elon musk

72

00:02:56,790 --> 00:02:54,160

our spacex ceo and lead designer

73

00:02:57,750 --> 00:02:56,800

uh thanks um well it's great to be here

74

00:03:00,630 --> 00:02:57,760

um

75

00:03:02,790 --> 00:03:00,640

just

76

00:03:04,790 --> 00:03:02,800

of course

77

00:03:06,070 --> 00:03:04,800

we love doing doing a good job for nasa

78

00:03:08,149 --> 00:03:06,080

so um

79

00:03:10,149 --> 00:03:08,159

the thank you for allowing us to deliver

80

00:03:11,990 --> 00:03:10,159

the cargo um

81

00:03:13,270 --> 00:03:12,000

and um

82

00:03:14,550 --> 00:03:13,280

the uh

83

00:03:16,710 --> 00:03:14,560

uh

84

00:03:19,110 --> 00:03:16,720

yeah i think the mice are doing well

85

00:03:20,630 --> 00:03:19,120

that's what i heard um i'm not sure

86

00:03:22,309 --> 00:03:20,640

they're happy though

87

00:03:23,350 --> 00:03:22,319

i think they might be a bit confused

88

00:03:24,309 --> 00:03:23,360

um

89

00:03:26,710 --> 00:03:24,319

so it's probably not on their

90

00:03:28,070 --> 00:03:26,720

evolutionary path to be in zero g

91

00:03:29,830 --> 00:03:28,080

but um

92

00:03:30,830 --> 00:03:29,840

but yeah there's a bunch of astronauts

93

00:03:32,949 --> 00:03:30,840

on on

94

00:03:35,750 --> 00:03:32,959

board so

95

00:03:37,430 --> 00:03:35,760

the the thing um that

96

00:03:39,110 --> 00:03:37,440

was a little different about this this

97

00:03:40,390 --> 00:03:39,120

mission on the rocket side was of course

98

00:03:41,750 --> 00:03:40,400

uh

99

00:03:44,229 --> 00:03:41,760

the rocket landed instead of putting a

100

00:03:46,550 --> 00:03:44,239

hole in the ship

101
00:03:48,789 --> 00:03:46,560
or or tipping over so

102
00:03:49,589 --> 00:03:48,799
um so we're really excited about about

103
00:03:51,910 --> 00:03:49,599
that

104
00:03:53,110 --> 00:03:51,920
and um

105
00:03:55,270 --> 00:03:53,120
the the reason that that's really

106
00:03:56,390 --> 00:03:55,280
important is about half of our missions

107
00:03:59,670 --> 00:03:56,400
are

108
00:04:00,710 --> 00:03:59,680
what we'll need to land out to sea

109
00:04:02,229 --> 00:04:00,720
um

110
00:04:04,710 --> 00:04:02,239
any emissions that are going to

111
00:04:07,670 --> 00:04:04,720
particularly to geostationary orbit um

112
00:04:09,350 --> 00:04:07,680
or to escape velocity uh anything beyond

113
00:04:10,630 --> 00:04:09,360

earth uh would

114

00:04:13,509 --> 00:04:10,640

is is

115

00:04:16,390 --> 00:04:13,519

likely to need to land on the ship

116

00:04:17,509 --> 00:04:16,400

um and i thought it would be worth just

117

00:04:19,270 --> 00:04:17,519

um

118

00:04:20,789 --> 00:04:19,280

emphasizing that the the reason for that

119

00:04:23,189 --> 00:04:20,799

is um

120

00:04:24,710 --> 00:04:23,199

something that i think uh it would be

121

00:04:26,390 --> 00:04:24,720

good for

122

00:04:28,790 --> 00:04:26,400

the press to educate the public about

123

00:04:31,670 --> 00:04:28,800

which is the difference between um

124

00:04:33,270 --> 00:04:31,680

space and velocity is space and orbit

125

00:04:35,430 --> 00:04:33,280

like arguably the space station should

126

00:04:36,950 --> 00:04:35,440

be called the orbit station

127

00:04:38,710 --> 00:04:36,960

because it's actually zooming around the

128

00:04:39,830 --> 00:04:38,720

earth at 17 and a half thousand miles an

129

00:04:41,510 --> 00:04:39,840

hour

130

00:04:44,070 --> 00:04:41,520

and it crosses the atlantic and i think

131

00:04:45,510 --> 00:04:44,080

about 20 minutes or so it's pretty

132

00:04:46,310 --> 00:04:45,520

pretty speedy

133

00:04:47,670 --> 00:04:46,320

um

134

00:04:50,070 --> 00:04:47,680

and that's that's for example why

135

00:04:52,790 --> 00:04:50,080

there's such a short launch window is

136

00:04:54,629 --> 00:04:52,800

because uh the rocket's got to get into

137

00:04:56,790 --> 00:04:54,639

orbit and kind of

138

00:04:59,110 --> 00:04:56,800

match the orbit with the with the space

139

00:05:01,029 --> 00:04:59,120

station um and it's it's moving so

140

00:05:02,710 --> 00:05:01,039

quickly that that orbital window is only

141

00:05:03,830 --> 00:05:02,720

open for a few seconds

142

00:05:06,390 --> 00:05:03,840

um

143

00:05:07,909 --> 00:05:06,400

so although a rocket looks like it's

144

00:05:10,390 --> 00:05:07,919

it's going it's going up because it

145

00:05:11,830 --> 00:05:10,400

starts off vertical actually it's it's

146

00:05:14,070 --> 00:05:11,840

going to very quickly turn and go

147

00:05:14,950 --> 00:05:14,080

sideways and go horizontal and it's

148

00:05:18,070 --> 00:05:14,960

going to

149

00:05:21,270 --> 00:05:18,080

match that space station velocity of

150

00:05:22,790 --> 00:05:21,280

roughly 17 000 miles an hour

151
00:05:28,310 --> 00:05:22,800
so

152
00:05:29,990 --> 00:05:28,320
separation is zooming out to speed at

153
00:05:31,110 --> 00:05:30,000
zooming out to sea at an incredible

154
00:05:32,070 --> 00:05:31,120
velocity

155
00:05:33,749 --> 00:05:32,080
um

156
00:05:36,390 --> 00:05:33,759
and it doesn't have

157
00:05:38,390 --> 00:05:36,400
enough repellent uh to come back to

158
00:05:40,150 --> 00:05:38,400
basically zero out that velocity

159
00:05:42,150 --> 00:05:40,160
boost back in the other direction and

160
00:05:43,590 --> 00:05:42,160
then land

161
00:05:46,070 --> 00:05:43,600
so in order to

162
00:05:49,350 --> 00:05:46,080
achieve effective reusability if you

163
00:05:51,029 --> 00:05:49,360

want missions to go to high orbit or to

164

00:05:54,710 --> 00:05:51,039

to escape velocity

165

00:05:56,309 --> 00:05:54,720

you really need the ocean landing

166

00:05:58,550 --> 00:05:56,319

and

167

00:06:00,070 --> 00:05:58,560

i just want to make sure that was

168

00:06:01,590 --> 00:06:00,080

explained and

169

00:06:03,350 --> 00:06:01,600

we can you know in the q a we can go

170

00:06:05,270 --> 00:06:03,360

maybe into a little more depth than that

171

00:06:07,830 --> 00:06:05,280

but

172

00:06:09,029 --> 00:06:07,840

i think as as things make progress i

173

00:06:10,629 --> 00:06:09,039

think it is

174

00:06:12,710 --> 00:06:10,639

um

175

00:06:14,629 --> 00:06:12,720

uh i think i think it would be good for

176

00:06:16,950 --> 00:06:14,639

the public to know uh a bit about all

177

00:06:19,510 --> 00:06:16,960

the orbital dynamics uh because it is a

178

00:06:21,909 --> 00:06:19,520

little counterintuitive um

179

00:06:23,749 --> 00:06:21,919

so anyway

180

00:06:25,590 --> 00:06:23,759

thank you elon and another hans

181

00:06:27,350 --> 00:06:25,600

koenigsmann our vice president for flight

182

00:06:28,710 --> 00:06:27,360

reliability it's because i i just kind

183

00:06:31,590 --> 00:06:28,720

of kind of fell down a little bit on the

184

00:06:33,749 --> 00:06:31,600

on the dragon side um i

185

00:06:35,909 --> 00:06:33,759

talked to mission control on the way up

186

00:06:37,510 --> 00:06:35,919

um all thrusters have been fired so we

187

00:06:38,870 --> 00:06:37,520

know dragon's healthy it's a good

188

00:06:39,990 --> 00:06:38,880

spacecraft

189

00:06:42,150 --> 00:06:40,000

everything's working our flight

190

00:06:45,189 --> 00:06:42,160

computers are running

191

00:06:46,070 --> 00:06:45,199

commons working communication is working

192

00:06:56,629 --> 00:06:46,080

the

193

00:06:58,150 --> 00:06:56,639

that is going to happen in about 2 hours

194

00:07:00,870 --> 00:06:58,160

and 15 minutes

195

00:07:03,110 --> 00:07:00,880

and then the first orbital adjustment

196

00:07:05,110 --> 00:07:03,120

burn is going to happen

197

00:07:07,990 --> 00:07:05,120

in tomorrow morning

198

00:07:11,270 --> 00:07:08,000

and docking with the space station then

199

00:07:13,909 --> 00:07:11,280

is currently planned for sunday morning

200

00:07:17,110 --> 00:07:13,919

it's i think six o'clock

201
00:07:18,950 --> 00:07:17,120
early in the morning at eastern time

202
00:07:21,270 --> 00:07:18,960
so everything is going well it's an uh

203
00:07:23,670 --> 00:07:21,280
it's an awesome day i think the team you

204
00:07:26,710 --> 00:07:23,680
know the both on on spacex side on nasa

205
00:07:27,589 --> 00:07:26,720
side and and and also on the 45th side

206
00:07:29,430 --> 00:07:27,599
um

207
00:07:31,670 --> 00:07:29,440
worked worked awesome together and we

208
00:07:34,070 --> 00:07:31,680
did a great launch

209
00:07:36,070 --> 00:07:34,080
thank god and we'll take questions now

210
00:07:38,870 --> 00:07:36,080
please give your name affiliation when

211
00:07:41,350 --> 00:07:38,880
the microphone comes to you let's start

212
00:07:44,150 --> 00:07:41,360
right here

213
00:07:45,749 --> 00:07:44,160

with uh

214

00:07:47,350 --> 00:07:45,759

here

215

00:07:49,990 --> 00:07:47,360

sorry sure thanks so much james dean

216

00:07:52,390 --> 00:07:50,000

florida today elon do you think this

217

00:07:54,230 --> 00:07:52,400

booster if it checks out okay will be

218

00:07:54,950 --> 00:07:54,240

the first to reply how soon could that

219

00:07:56,550 --> 00:07:54,960

be

220

00:07:59,270 --> 00:07:56,560

uh yeah that's a good question i think

221

00:08:01,270 --> 00:07:59,280

that that's likely um

222

00:08:03,189 --> 00:08:01,280

so the the plan is to

223

00:08:05,670 --> 00:08:03,199

bring this booster back should arrive in

224

00:08:08,629 --> 00:08:05,680

port on sunday um

225

00:08:11,029 --> 00:08:08,639

and uh and then we're gonna uh

226

00:08:13,270 --> 00:08:11,039

do a series of test fires

227

00:08:15,350 --> 00:08:13,280

we're hoping to do that at the cave

228

00:08:17,589 --> 00:08:15,360

rather than transport it to texas and

229

00:08:19,589 --> 00:08:17,599

then bring it back

230

00:08:21,830 --> 00:08:19,599

so our thought is to do to basically

231

00:08:23,589 --> 00:08:21,840

fire it uh 10 times in a row on the

232

00:08:24,550 --> 00:08:23,599

ground

233

00:08:25,909 --> 00:08:24,560

and

234

00:08:27,990 --> 00:08:25,919

if that looks if things look good at

235

00:08:29,670 --> 00:08:28,000

that point uh we feel it's

236

00:08:31,510 --> 00:08:29,680

uh sort of uh

237

00:08:34,870 --> 00:08:31,520

qualified for reason

238

00:08:37,430 --> 00:08:34,880

uh in launch um and we're hoping to

239

00:08:39,829 --> 00:08:37,440

uh relaunch uh

240

00:08:42,070 --> 00:08:39,839

on orbital mission probably around uh

241

00:08:43,430 --> 00:08:42,080

may or june so it's pretty soon may if

242

00:08:49,190 --> 00:08:43,440

let's say june

243

00:08:53,430 --> 00:08:50,630

just clarify that you're gonna you could

244

00:08:55,430 --> 00:08:53,440

relaunch this booster within

245

00:08:57,110 --> 00:08:55,440

a few months yeah yeah

246

00:08:58,790 --> 00:08:57,120

but what i mean in the future hopefully

247

00:09:00,870 --> 00:08:58,800

we'll be able to relaunch them within a

248

00:09:02,230 --> 00:09:00,880

few weeks

249

00:09:06,310 --> 00:09:02,240

irene

250

00:09:07,990 --> 00:09:06,320

congratulations first of all and

251

00:09:09,670 --> 00:09:08,000

with this uh would that be a test flight

252

00:09:12,150 --> 00:09:09,680

or would you hope to have a customer for

253

00:09:14,310 --> 00:09:12,160

that and um also this has been kind of a

254

00:09:16,470 --> 00:09:14,320

long time coming for you how do you feel

255

00:09:19,269 --> 00:09:16,480

about this and were you surprised to

256

00:09:21,190 --> 00:09:19,279

actually see it stick the landing

257

00:09:31,110 --> 00:09:21,200

um

258

00:09:32,150 --> 00:09:31,120

consensus was

259

00:09:34,389 --> 00:09:32,160

was

260

00:09:36,470 --> 00:09:34,399

about two to one so we did we thought it

261

00:09:38,310 --> 00:09:36,480

was more likely than not that uh this

262

00:09:40,150 --> 00:09:38,320

mission would would work but still

263

00:09:41,910 --> 00:09:40,160

probably you know one-third chance of

264

00:09:44,870 --> 00:09:41,920

failure um

265

00:09:47,590 --> 00:09:44,880

and um but we eliminated the reasons

266

00:09:49,509 --> 00:09:47,600

that the prior reasons um so we were

267

00:09:51,030 --> 00:09:49,519

confident that if it did fail it would

268

00:09:52,070 --> 00:09:51,040

fail for a new reason

269

00:09:53,190 --> 00:09:52,080

um

270

00:09:57,430 --> 00:09:53,200

so

271

00:09:58,310 --> 00:09:57,440

for rockets to fail

272

00:10:00,230 --> 00:09:58,320

so

273

00:10:02,069 --> 00:10:00,240

um

274

00:10:04,870 --> 00:10:02,079

but this is a beautiful day and i think

275

00:10:07,190 --> 00:10:04,880

every the circumstances were good

276

00:10:08,790 --> 00:10:07,200

um it's still quite tricky to to land on

277

00:10:10,470 --> 00:10:08,800

a ship and if you

278

00:10:11,430 --> 00:10:10,480

on the video i mean the ship looks quite

279

00:10:14,790 --> 00:10:11,440

small

280

00:10:16,150 --> 00:10:14,800

um relative to the rocket

281

00:10:18,710 --> 00:10:16,160

and

282

00:10:20,069 --> 00:10:18,720

so so it's um it's quite a tiny target

283

00:10:21,110 --> 00:10:20,079

it's really trying to land on a postage

284

00:10:22,150 --> 00:10:21,120

stamp there

285

00:10:25,030 --> 00:10:22,160

um

286

00:10:27,269 --> 00:10:25,040

and and and it's it's moving

287

00:10:28,949 --> 00:10:27,279

sort of translating and rotating it's

288

00:10:31,910 --> 00:10:28,959

sort of like like a carrier landing

289

00:10:34,470 --> 00:10:31,920

versus a land landing um

290

00:10:36,550 --> 00:10:34,480

it's a tiny tinier spot and it's it's

291

00:10:38,069 --> 00:10:36,560

moving

292

00:10:40,710 --> 00:10:38,079

the use of the

293

00:10:43,430 --> 00:10:40,720

reef would that be a an actual paying

294

00:10:46,389 --> 00:10:43,440

customer on it or would you do that

295

00:10:48,470 --> 00:10:46,399

just as an experiment to relaunch it um

296

00:10:49,509 --> 00:10:48,480

we think it'll be a paying customer but

297

00:10:54,949 --> 00:10:49,519

but that's

298

00:11:00,790 --> 00:10:58,230

all right let's go right here

299

00:11:02,310 --> 00:11:00,800

so elon having achieved this uh

300

00:11:04,069 --> 00:11:02,320

this milestone here what does that mean

301
00:11:05,590 --> 00:11:04,079
for the future of spacex and for this

302
00:11:07,190 --> 00:11:05,600
future space flight

303
00:11:09,750 --> 00:11:07,200
yeah i think this is i think this is a

304
00:11:11,269 --> 00:11:09,760
really good milestone for the future of

305
00:11:15,509 --> 00:11:11,279
space flight you know i think it's

306
00:11:17,670 --> 00:11:15,519
another step towards the stars

307
00:11:19,110 --> 00:11:17,680
in order for us to

308
00:11:22,389 --> 00:11:19,120
really open up

309
00:11:25,190 --> 00:11:22,399
access to space we've got to achieve

310
00:11:27,750 --> 00:11:25,200
full and rapid reusability

311
00:11:30,949 --> 00:11:27,760
and being able to to do that for the the

312
00:11:33,670 --> 00:11:30,959
primary rocket booster is is going to be

313
00:11:35,190 --> 00:11:33,680

a huge uh

314

00:11:36,389 --> 00:11:35,200

impact on on

315

00:11:37,990 --> 00:11:36,399

cost

316

00:11:40,389 --> 00:11:38,000

now it'll still take us

317

00:11:43,750 --> 00:11:40,399

you know a few years to

318

00:11:44,870 --> 00:11:43,760

make that smooth and make it efficient

319

00:11:47,590 --> 00:11:44,880

but it's

320

00:11:48,310 --> 00:11:47,600

i think it's proven that it can work

321

00:11:49,350 --> 00:11:48,320

and

322

00:11:51,430 --> 00:11:49,360

you know there probably will be some

323

00:11:52,230 --> 00:11:51,440

failures in the future

324

00:11:53,910 --> 00:11:52,240

but

325

00:11:56,310 --> 00:11:53,920

we will iron those out and get it to the

326

00:11:58,629 --> 00:11:56,320

point where it's a routine

327

00:12:02,310 --> 00:11:58,639

it's routine to bring it back and where

328

00:12:03,430 --> 00:12:02,320

the only changes to the rocket are

329

00:12:05,750 --> 00:12:03,440

you know maybe

330

00:12:11,509 --> 00:12:08,150

hose it down or you know clean

331

00:12:12,550 --> 00:12:11,519

and give you know give it a wash and

332

00:12:14,470 --> 00:12:12,560

um

333

00:12:15,350 --> 00:12:14,480

add the propellant and fly again that's

334

00:12:16,870 --> 00:12:15,360

the key

335

00:12:18,230 --> 00:12:16,880

it's full and rapid reusability is

336

00:12:18,949 --> 00:12:18,240

fundamental

337

00:12:20,150 --> 00:12:18,959

yeah

338

00:12:22,870 --> 00:12:20,160

bill

339

00:12:23,910 --> 00:12:22,880

oh well marshall was ahead of me

340

00:12:26,069 --> 00:12:23,920

okay

341

00:12:28,870 --> 00:12:26,079

marsha done associated press for uh mr

342

00:12:31,670 --> 00:12:28,880

musk um where do you expect the stage

343

00:12:33,030 --> 00:12:31,680

that landed in december on land where is

344

00:12:34,389 --> 00:12:33,040

that going to end up is that going to be

345

00:12:36,949 --> 00:12:34,399

on display at your headquarters

346

00:12:38,710 --> 00:12:36,959

ultimately and soon hopefully oh

347

00:12:40,150 --> 00:12:38,720

hopefully is that the

348

00:12:41,990 --> 00:12:40,160

we just got um

349

00:12:43,269 --> 00:12:42,000

our headquarters are close to the day or

350

00:12:45,190 --> 00:12:43,279

adjacent to hawthorne airport so we

351
00:12:48,310 --> 00:12:45,200
needed faa permission because it would

352
00:12:49,190 --> 00:12:48,320
be like a the highest object for

353
00:12:51,190 --> 00:12:49,200
um

354
00:12:53,350 --> 00:12:51,200
quite a distance around the airport but

355
00:12:55,430 --> 00:12:53,360
we just i believe got that permission so

356
00:12:57,350 --> 00:12:55,440
we're planning on putting the

357
00:12:59,269 --> 00:12:57,360
um the first uh the rocket that landed

358
00:13:01,269 --> 00:12:59,279
back the cape um

359
00:13:03,190 --> 00:13:01,279
in front of the spacex headquarters and

360
00:13:05,190 --> 00:13:03,200
hawthorne hopefully in the next few

361
00:13:07,110 --> 00:13:05,200
months oh okay thank you and and could

362
00:13:09,350 --> 00:13:07,120
you tell what was the velocity and the

363
00:13:10,870 --> 00:13:09,360

altitude for this booster

364

00:13:12,470 --> 00:13:10,880

um what's the highest altitude it

365

00:13:14,470 --> 00:13:12,480

reached in this peak speed before it

366

00:13:16,230 --> 00:13:14,480

started coming back

367

00:13:20,150 --> 00:13:16,240

so uh

368

00:13:21,990 --> 00:13:20,160

actually i i don't actually know

369

00:13:25,190 --> 00:13:22,000

um 200 usually

370

00:13:27,430 --> 00:13:25,200

yeah the the for for leo emissions the

371

00:13:29,509 --> 00:13:27,440

peak altitude is usually not super high

372

00:13:30,710 --> 00:13:29,519

like it's it's would have been you know

373

00:13:32,790 --> 00:13:30,720

something around a couple hundred

374

00:13:33,750 --> 00:13:32,800

kilometers um

375

00:13:35,670 --> 00:13:33,760

and

376

00:13:38,150 --> 00:13:35,680

the the velocity also is not as high as

377

00:13:39,990 --> 00:13:38,160

says as it would have been on the the

378

00:13:41,670 --> 00:13:40,000

last mission but the highest velocity

379

00:13:44,790 --> 00:13:41,680

emissions that we see

380

00:13:46,710 --> 00:13:44,800

are the the geostationary missions um so

381

00:13:49,110 --> 00:13:46,720

so for example for this mission

382

00:13:50,389 --> 00:13:49,120

actually we we could have brought it

383

00:13:51,350 --> 00:13:50,399

back to land

384

00:13:55,030 --> 00:13:51,360

um

385

00:13:59,430 --> 00:13:56,550

do it do a ship landing where we had

386

00:14:00,150 --> 00:13:59,440

lots of lots of margin

387

00:14:01,590 --> 00:14:00,160

so

388

00:14:05,829 --> 00:14:01,600

it would have been a low margin return

389

00:14:07,269 --> 00:14:05,839

to land or a high margin ship landing um

390

00:14:09,110 --> 00:14:07,279

and so this

391

00:14:11,350 --> 00:14:09,120

i think um

392

00:14:13,910 --> 00:14:11,360

really you know helped us show that the

393

00:14:16,389 --> 00:14:13,920

ship landing could work um but in terms

394

00:14:18,629 --> 00:14:16,399

of the the maximum sort of transfer

395

00:14:20,949 --> 00:14:18,639

velocity which is this is really the key

396

00:14:23,110 --> 00:14:20,959

figure of merit for the boost stage uh

397

00:14:25,509 --> 00:14:23,120

the maximum transfer velocity is is we

398

00:14:26,870 --> 00:14:25,519

think we'll get up to about uh 9 000

399

00:14:29,189 --> 00:14:26,880

maybe 10 000

400

00:14:31,350 --> 00:14:29,199

kilometers per hour

401
00:14:33,110 --> 00:14:31,360
um and that's transferring

402
00:14:34,710 --> 00:14:33,120
um an upper stage

403
00:14:36,870 --> 00:14:34,720
load up

404
00:14:39,910 --> 00:14:36,880
upstairs with payload plus fairing you

405
00:14:43,269 --> 00:14:39,920
talk about 120 tons or thereabouts

406
00:14:44,949 --> 00:14:43,279
so it's 120 tons to upwards of 10 000

407
00:14:47,350 --> 00:14:44,959
kilometers an hour

408
00:14:49,110 --> 00:14:47,360
so it's sort of quite a javelin throw

409
00:14:52,949 --> 00:14:49,120
yeah

410
00:14:54,790 --> 00:14:52,959
very quick questions one is i realize

411
00:14:56,629 --> 00:14:54,800
it's a fairly calm sea today but those

412
00:14:58,870 --> 00:14:56,639
of us not looking used to looking at

413
00:15:00,310 --> 00:14:58,880

barges in the ocean looked like it was

414

00:15:01,990 --> 00:15:00,320

rocking pretty good what is just out of

415

00:15:03,750 --> 00:15:02,000

curiosity the maximum

416

00:15:05,350 --> 00:15:03,760

tilt the rocket could stand and stay

417

00:15:06,790 --> 00:15:05,360

vertical number one

418

00:15:08,150 --> 00:15:06,800

and two can you talk a little bit about

419

00:15:10,069 --> 00:15:08,160

increasing your launch pace you guys

420

00:15:11,670 --> 00:15:10,079

have a really busy manifest

421

00:15:13,030 --> 00:15:11,680

you're starting to ramp things up here

422

00:15:14,870 --> 00:15:13,040

and do you need more people can you do

423

00:15:16,870 --> 00:15:14,880

it with the crew you currently have here

424

00:15:19,670 --> 00:15:16,880

and at vandenbergh just generally

425

00:15:21,110 --> 00:15:19,680

about the face thanks sure well

426
00:15:22,629 --> 00:15:21,120
um

427
00:15:24,870 --> 00:15:22,639
first of all i'd say it's it's a it's a

428
00:15:27,189 --> 00:15:24,880
ship it used to be a barge

429
00:15:30,069 --> 00:15:27,199
but uh when we added engines and control

430
00:15:32,710 --> 00:15:30,079
systems and everything um it's not i

431
00:15:34,710 --> 00:15:32,720
think it's sort of very cool leadership

432
00:15:36,310 --> 00:15:34,720
has four engines

433
00:15:37,670 --> 00:15:36,320
so

434
00:15:39,670 --> 00:15:37,680
um

435
00:15:40,389 --> 00:15:39,680
but uh

436
00:15:41,509 --> 00:15:40,399
today

437
00:15:43,749 --> 00:15:41,519
uh the

438
00:15:45,590 --> 00:15:43,759

the pitch and roll was about uh two to

439

00:15:46,710 --> 00:15:45,600

three degrees so it was actually not not

440

00:15:48,230 --> 00:15:46,720

too bad

441

00:15:53,030 --> 00:15:48,240

um

442

00:15:54,710 --> 00:15:53,040

i well probably

443

00:15:56,949 --> 00:15:54,720

you know i'd say

444

00:15:58,790 --> 00:15:56,959

we could do double double that easily

445

00:16:01,110 --> 00:15:58,800

and maybe triple

446

00:16:03,110 --> 00:16:01,120

so maybe it's eight or nine degrees but

447

00:16:04,310 --> 00:16:03,120

that that's probably about the limit

448

00:16:05,790 --> 00:16:04,320

um

449

00:16:08,389 --> 00:16:05,800

that would be real really

450

00:16:09,829 --> 00:16:08,399

intensities um

451
00:16:11,590 --> 00:16:09,839
and

452
00:16:14,150 --> 00:16:11,600
we also see some translation where it's

453
00:16:16,069 --> 00:16:14,160
going up and down so it's both rotating

454
00:16:17,670 --> 00:16:16,079
and translating

455
00:16:19,990 --> 00:16:17,680
so it's it's tricky just just like a

456
00:16:20,829 --> 00:16:20,000
carrier landing

457
00:16:25,350 --> 00:16:20,839
but

458
00:16:27,430 --> 00:16:25,360
going to absolute position so the the

459
00:16:29,509 --> 00:16:27,440
the ship is holding to absolute gps

460
00:16:31,749 --> 00:16:29,519
position uh with the relative gps and

461
00:16:34,389 --> 00:16:31,759
today was actually holding to with um

462
00:16:35,509 --> 00:16:34,399
accuracy of of lower meter

463
00:16:37,590 --> 00:16:35,519

um

464

00:16:39,590 --> 00:16:37,600

and it's got four engines that all of

465

00:16:41,829 --> 00:16:39,600

which can rotate 360 degrees and they're

466

00:16:45,749 --> 00:16:41,839

operating continuously to hold both the

467

00:16:49,269 --> 00:16:47,189

and

468

00:16:50,629 --> 00:16:49,279

in terms of

469

00:16:52,230 --> 00:16:50,639

increasing

470

00:16:53,829 --> 00:16:52,240

our head count i think that's that's

471

00:16:55,910 --> 00:16:53,839

going to continue to grow

472

00:16:57,350 --> 00:16:55,920

um and our launch rate is going to

473

00:16:59,269 --> 00:16:57,360

continue to grow

474

00:17:01,030 --> 00:16:59,279

um we're

475

00:17:02,870 --> 00:17:01,040

expecting by

476

00:17:04,549 --> 00:17:02,880

um you know maybe the third third or

477

00:17:06,390 --> 00:17:04,559

fourth quarter that would be

478

00:17:09,829 --> 00:17:06,400

doing a launch every

479

00:17:12,710 --> 00:17:09,839

uh you know two to three weeks

480

00:17:17,350 --> 00:17:14,150

thanks so stephen clark from space

481

00:17:19,990 --> 00:17:17,360

flight now um a couple of clarifications

482

00:17:21,590 --> 00:17:20,000

um i believe earlier you've talked about

483

00:17:23,029 --> 00:17:21,600

securing the rocket on the drone ship

484

00:17:24,470 --> 00:17:23,039

with welded shoes i was wondering if

485

00:17:26,230 --> 00:17:24,480

that's still the what's happening that's

486

00:17:27,909 --> 00:17:26,240

still we're welding it down

487

00:17:29,830 --> 00:17:27,919

yeah and make sure it doesn't tip over

488

00:17:31,350 --> 00:17:29,840

okay there's there's potentially some

489

00:17:33,510 --> 00:17:31,360

there's potentially some heavy winds

490

00:17:35,110 --> 00:17:33,520

coming in um so

491

00:17:37,190 --> 00:17:35,120

once the rocket's safe the crew is going

492

00:17:39,029 --> 00:17:37,200

to go on there and then we've got these

493

00:17:43,270 --> 00:17:39,039

uh steel shoes that we put over the

494

00:17:44,470 --> 00:17:43,280

landing feet and weld it to the deck

495

00:17:45,669 --> 00:17:44,480

and

496

00:17:47,430 --> 00:17:45,679

one more clarification is it still

497

00:17:49,590 --> 00:17:47,440

coming into port canaveral is that the

498

00:17:51,510 --> 00:17:49,600

plan um actually i'm not certain about

499

00:17:52,870 --> 00:17:51,520

that i think that certainly is where it

500

00:17:54,710 --> 00:17:52,880

will ultimately be i'm not sure if that

501
00:17:56,549 --> 00:17:54,720
is the initial destination

502
00:17:57,909 --> 00:17:56,559
okay

503
00:18:00,950 --> 00:17:57,919
all right let's come back over here on

504
00:18:02,950 --> 00:18:00,960
this side of the room right here

505
00:18:05,110 --> 00:18:02,960
right here

506
00:18:06,310 --> 00:18:05,120
uh sawyer rosenstein with talking space

507
00:18:07,590 --> 00:18:06,320
kind of going along with that can you

508
00:18:09,909 --> 00:18:07,600
talk a little bit about the process of

509
00:18:11,909 --> 00:18:09,919
exactly how it gets you know to that

510
00:18:13,590 --> 00:18:11,919
drone how it stays on that drone

511
00:18:15,590 --> 00:18:13,600
ship and then the process of what

512
00:18:18,150 --> 00:18:15,600
exactly happens from now that it's on

513
00:18:21,270 --> 00:18:18,160

until it gets back into port

514

00:18:23,990 --> 00:18:22,390

we're a little bit like the dog that

515

00:18:29,909 --> 00:18:24,000

caught the bus you know

516

00:18:33,430 --> 00:18:31,110

but uh

517

00:18:34,230 --> 00:18:33,440

it the the plan is to bring it into port

518

00:18:36,549 --> 00:18:34,240

um

519

00:18:38,310 --> 00:18:36,559

then take uh that there's there's a load

520

00:18:40,549 --> 00:18:38,320

head fixture that we can put on the top

521

00:18:42,870 --> 00:18:40,559

of the the rocket uh kind of where the

522

00:18:43,990 --> 00:18:42,880

the stage separation mechanism attaches

523

00:18:45,350 --> 00:18:44,000

and then we can pick it up with the

524

00:18:47,669 --> 00:18:45,360

crane and then

525

00:18:49,029 --> 00:18:47,679

put on to land um

526
00:18:51,190 --> 00:18:49,039
and then we've got a oh we actually have

527
00:18:53,270 --> 00:18:51,200
like like a like a stand that we put it

528
00:18:56,470 --> 00:18:53,280
on and then

529
00:18:57,990 --> 00:18:56,480
the stand attaches the launch hold downs

530
00:19:00,470 --> 00:18:58,000
and then we can

531
00:19:02,710 --> 00:19:00,480
fold the legs up um

532
00:19:05,510 --> 00:19:02,720
then the crane rotates it horizontal for

533
00:19:08,070 --> 00:19:05,520
transport and rings should bring it to

534
00:19:12,630 --> 00:19:08,830
probably

535
00:19:15,669 --> 00:19:12,640
39a and then we're going to do some

536
00:19:18,470 --> 00:19:15,679
do those like those 10 test firings

537
00:19:21,350 --> 00:19:18,480
and if that all goes well then

538
00:19:25,029 --> 00:19:22,870

comfortable with

539

00:19:25,830 --> 00:19:25,039

with an orbital flight

540

00:19:28,070 --> 00:19:25,840

okay

541

00:19:29,909 --> 00:19:28,080

right here

542

00:19:31,669 --> 00:19:29,919

jason ryan with spaceflightinsider.com

543

00:19:33,510 --> 00:19:31,679

and i kind of want to take a back a

544

00:19:35,590 --> 00:19:33,520

little bit to orcom og2 this past

545

00:19:37,750 --> 00:19:35,600

december you successfully landed a

546

00:19:39,029 --> 00:19:37,760

landing zone one kind of carrying out a

547

00:19:41,350 --> 00:19:39,039

test flight there

548

00:19:43,590 --> 00:19:41,360

and today he carried out a test flight

549

00:19:45,510 --> 00:19:43,600

more or less on ocean so can you talk a

550

00:19:46,950 --> 00:19:45,520

little bit about spacex's plans to

551
00:19:49,029 --> 00:19:46,960
actually incorporate the testing of its

552
00:19:51,750 --> 00:19:49,039
technology successfully i might add

553
00:19:53,190 --> 00:19:51,760
while still sending payloads to orbit

554
00:19:54,870 --> 00:19:53,200
thank you

555
00:19:55,990 --> 00:19:54,880
um i'm not sure i totally understand the

556
00:19:57,669 --> 00:19:56,000
question so

557
00:20:00,070 --> 00:19:57,679
um

558
00:20:02,630 --> 00:20:01,029
i'm not sure i can understand the

559
00:20:03,750 --> 00:20:02,640
question incorporating spacex's

560
00:20:05,190 --> 00:20:03,760
technology

561
00:20:06,630 --> 00:20:05,200
to test flights while you're still

562
00:20:08,630 --> 00:20:06,640
sending payloads to orbit i mean you're

563
00:20:10,230 --> 00:20:08,640

mostly they break up their test program

564

00:20:11,590 --> 00:20:10,240

away from sending payloads orbits but

565

00:20:12,710 --> 00:20:11,600

you've actually managed to incorporate

566

00:20:15,430 --> 00:20:12,720

the two can you talk a little bit about

567

00:20:16,470 --> 00:20:15,440

that philosophy oh um yeah sure well i

568

00:20:18,470 --> 00:20:16,480

guess uh

569

00:20:21,110 --> 00:20:18,480

um

570

00:20:23,510 --> 00:20:21,120

the the problem with uh you know as soon

571

00:20:24,870 --> 00:20:23,520

as you're going going to orbit um

572

00:20:26,149 --> 00:20:24,880

your your

573

00:20:28,870 --> 00:20:26,159

your horizontal velocity i'm like i

574

00:20:30,710 --> 00:20:28,880

really can't um emphasize horizontal

575

00:20:34,070 --> 00:20:30,720

velocity enough it's um because it's so

576
00:20:36,789 --> 00:20:34,080
counterintuitive um

577
00:20:38,230 --> 00:20:36,799
it it's super high um

578
00:20:40,310 --> 00:20:38,240
so the

579
00:20:43,029 --> 00:20:40,320
uh it's really hard to do these test

580
00:20:45,669 --> 00:20:43,039
flights um

581
00:20:48,630 --> 00:20:45,679
without actually going orbit

582
00:20:52,149 --> 00:20:48,640
um like we could conceivably i suppose

583
00:20:54,789 --> 00:20:52,159
uh put a huge weight um 120 ton weight

584
00:20:56,950 --> 00:20:54,799
on top of the boost stage um and then

585
00:20:59,110 --> 00:20:56,960
and then do these launches drop the 120

586
00:21:00,390 --> 00:20:59,120
ton weight and then try to land

587
00:21:02,310 --> 00:21:00,400
um

588
00:21:04,390 --> 00:21:02,320

but but there's no point doing that why

589

00:21:06,070 --> 00:21:04,400

not just send a useful

590

00:21:07,669 --> 00:21:06,080

payload while you're at it instead of

591

00:21:09,270 --> 00:21:07,679

the dead weight so

592

00:21:10,710 --> 00:21:09,280

um

593

00:21:13,270 --> 00:21:10,720

and but but that's why it's really hard

594

00:21:15,110 --> 00:21:13,280

to do these these met these tests

595

00:21:17,430 --> 00:21:15,120

it's really basically impossible to do

596

00:21:19,909 --> 00:21:17,440

these tests on land unless you had like

597

00:21:21,029 --> 00:21:19,919

siberia or something because it's just

598

00:21:24,549 --> 00:21:21,039

if

599

00:21:26,230 --> 00:21:24,559

and and the rocket

600

00:21:27,909 --> 00:21:26,240

engines didn't re-light

601
00:21:30,789 --> 00:21:27,919
it would have a ballistic trajectory and

602
00:21:32,230 --> 00:21:30,799
land like hundreds of miles away like

603
00:21:34,230 --> 00:21:32,240
several like

604
00:21:36,870 --> 00:21:34,240
you know anywhere from

605
00:21:39,270 --> 00:21:36,880
500 to a thousand miles away

606
00:21:41,110 --> 00:21:39,280
so it could randomly smash down on on a

607
00:21:43,270 --> 00:21:41,120
city somewhere

608
00:21:45,270 --> 00:21:43,280
that's why you need you want to do the

609
00:21:46,549 --> 00:21:45,280
ocean um

610
00:21:49,110 --> 00:21:46,559
launches

611
00:21:51,110 --> 00:21:49,120
um so if if it isn't able to turn

612
00:21:53,110 --> 00:21:51,120
around and re-light the engines

613
00:21:56,070 --> 00:21:53,120

um then it's it's gonna you're gonna

614

00:21:57,590 --> 00:21:56,080

sort of smash into the ocean honestly

615

00:21:59,909 --> 00:21:57,600

we are taking questions from social

616

00:22:02,390 --> 00:21:59,919

media as well if you use uh

617

00:22:04,390 --> 00:22:02,400

ask nasa you can also ask some questions

618

00:22:06,950 --> 00:22:04,400

let's come here to the front to daryl

619

00:22:09,110 --> 00:22:06,960

daryl nail fox35 um

620

00:22:11,510 --> 00:22:09,120

this would seem like a big week for you

621

00:22:13,350 --> 00:22:11,520

your car company earlier in the week big

622

00:22:15,590 --> 00:22:13,360

moment for your aerospace aerospace

623

00:22:18,789 --> 00:22:15,600

company today can you kind of talk me

624

00:22:21,270 --> 00:22:18,799

through what that moment was like um two

625

00:22:22,789 --> 00:22:21,280

questions what that moment was like um

626

00:22:24,789 --> 00:22:22,799

where you were watching it what you were

627

00:22:29,029 --> 00:22:24,799

feeling you know did you turn in hug

628

00:22:32,870 --> 00:22:30,470

i have a confession to make i i didn't

629

00:22:39,029 --> 00:22:32,880

need hog hands

630

00:22:42,710 --> 00:22:40,470

tilt to the rocket when it came down

631

00:22:44,710 --> 00:22:42,720

yeah yeah absolutely um it was uh i

632

00:22:47,190 --> 00:22:44,720

think the whole spacex team was super

633

00:22:48,390 --> 00:22:47,200

excited um they've all worked incredibly

634

00:22:49,990 --> 00:22:48,400

hard to

635

00:22:52,870 --> 00:22:50,000

uh get to this day

636

00:22:53,669 --> 00:22:52,880

and um it's a lot of work ahead for sure

637

00:22:55,110 --> 00:22:53,679

um

638

00:22:59,669 --> 00:22:55,120

because making the

639

00:23:05,669 --> 00:23:03,430

easy is is hard

640

00:23:09,750 --> 00:23:05,679

and

641

00:23:12,230 --> 00:23:09,760

thing that's that's really important for

642

00:23:13,990 --> 00:23:12,240

the reusability to be cost effective

643

00:23:15,110 --> 00:23:14,000

like an aircraft

644

00:23:17,110 --> 00:23:15,120

so if

645

00:23:19,590 --> 00:23:17,120

you know an aircraft you can

646

00:23:21,830 --> 00:23:19,600

you can recycle a 747

647

00:23:23,750 --> 00:23:21,840

that went from london to

648

00:23:25,909 --> 00:23:23,760

los angeles and you recycle that in

649

00:23:28,070 --> 00:23:25,919

three hours two three hours maybe

650

00:23:29,590 --> 00:23:28,080

and and do another flight

651
00:23:31,190 --> 00:23:29,600
we got to ultimately get rockets to that

652
00:23:33,430 --> 00:23:31,200
point

653
00:23:33,440 --> 00:23:37,350
kind of explain oh the

654
00:23:41,590 --> 00:23:39,430
it was quite windy um so it had winds up

655
00:23:43,669 --> 00:23:41,600
to 50 miles an hour on

656
00:23:46,470 --> 00:23:43,679
as it was coming coming down

657
00:23:49,590 --> 00:23:46,480
so it's tilting into the wind

658
00:23:51,190 --> 00:23:49,600
okay question right here

659
00:23:52,549 --> 00:23:51,200
hi josh dinner with the orbital dot

660
00:23:55,110 --> 00:23:52,559
space first off i just want to say

661
00:23:57,830 --> 00:23:55,120
congratulations um secondly i want to

662
00:23:59,350 --> 00:23:57,840
ask about the falcon 9 heavy um given

663
00:24:01,590 --> 00:23:59,360

that it's going to be

664

00:24:05,269 --> 00:24:01,600

going further and faster what will be

665

00:24:07,350 --> 00:24:05,279

the reuse capabilities of those stages

666

00:24:09,510 --> 00:24:07,360

falcon heavy i say think about that this

667

00:24:10,390 --> 00:24:09,520

is like quite high parker factor about

668

00:24:12,390 --> 00:24:10,400

uh

669

00:24:13,990 --> 00:24:12,400

falcon heavy um

670

00:24:15,750 --> 00:24:14,000

that that's uh

671

00:24:20,549 --> 00:24:15,760

you know originally i mean maybe we

672

00:24:25,029 --> 00:24:22,950

we thought maybe that people

673

00:24:27,669 --> 00:24:25,039

might look at that um it's a lot of

674

00:24:29,190 --> 00:24:27,679

engines to work simultaneously

675

00:24:33,510 --> 00:24:29,200

and

676

00:24:34,789 --> 00:24:33,520

separation events so

677

00:24:36,310 --> 00:24:34,799

it's um

678

00:24:39,190 --> 00:24:36,320

it's a lot more it's a lot trickier of a

679

00:24:40,230 --> 00:24:39,200

proposition than than falcon 9.

680

00:24:44,870 --> 00:24:40,240

um

681

00:24:47,190 --> 00:24:44,880

are amazing and it's it's got a lot of

682

00:24:49,029 --> 00:24:47,200

potential

683

00:24:51,510 --> 00:24:49,039

and

684

00:24:54,630 --> 00:24:51,520

particularly for

685

00:24:57,350 --> 00:24:54,640

uh doing the heavy high altitude

686

00:24:59,590 --> 00:24:57,360

geostationary satellites um that

687

00:25:01,669 --> 00:24:59,600

currently can only be flown

688

00:25:03,830 --> 00:25:01,679

by um

689

00:25:06,870 --> 00:25:03,840

by aureon like that or you know that if

690

00:25:09,350 --> 00:25:06,880

it's a really heavy satellite um

691

00:25:11,909 --> 00:25:09,360

good yeah so so that's um

692

00:25:14,070 --> 00:25:11,919

that's going to be an important

693

00:25:14,950 --> 00:25:14,080

mission for showing that we can we can

694

00:25:16,390 --> 00:25:14,960

do

695

00:25:18,789 --> 00:25:16,400

the the biggest satellites in the world

696

00:25:20,870 --> 00:25:18,799

and that and then some um

697

00:25:23,269 --> 00:25:20,880

if falcon heavy you know if it reaches

698

00:25:24,710 --> 00:25:23,279

orbit um it uh

699

00:25:26,950 --> 00:25:24,720

it'll be the uh

700

00:25:29,350 --> 00:25:26,960

the biggest rocket to reach orbit since

701
00:25:32,549 --> 00:25:29,360
um well

702
00:25:35,510 --> 00:25:32,559
yeah uh well since by the way since the

703
00:25:37,190 --> 00:25:35,520
space shuttle and the um

704
00:25:39,269 --> 00:25:37,200
and saturn v and it'll be the biggest

705
00:25:41,029 --> 00:25:39,279
operating rocket today until sls is

706
00:25:43,750 --> 00:25:41,039
active

707
00:25:45,110 --> 00:25:43,760
so um

708
00:25:46,870 --> 00:25:45,120
it'd be

709
00:25:47,830 --> 00:25:46,880
lift off thrust approaching five million

710
00:25:49,110 --> 00:25:47,840
pounds

711
00:25:50,390 --> 00:25:49,120
um

712
00:25:52,070 --> 00:25:50,400
seven five in the shuttle were about

713
00:25:54,390 --> 00:25:52,080

seven and a half

714

00:25:56,310 --> 00:25:54,400

um yeah okay let's take a question here

715

00:25:58,230 --> 00:25:56,320

and then we'll do some social media jd

716

00:26:00,230 --> 00:25:58,240

taylor with usa in space again

717

00:26:02,470 --> 00:26:00,240

congratulations and also congratulations

718

00:26:03,430 --> 00:26:02,480

on your model 3 launch as well

719

00:26:05,990 --> 00:26:03,440

uh

720

00:26:07,990 --> 00:26:06,000

when how often do you plan to do ground

721

00:26:11,669 --> 00:26:08,000

landings and when is the next one that

722

00:26:13,350 --> 00:26:11,679

you're going to attempt to do

723

00:26:15,430 --> 00:26:13,360

right now the

724

00:26:18,310 --> 00:26:15,440

we expect about half of our landings to

725

00:26:19,990 --> 00:26:18,320

be ground and then half to be

726

00:26:22,470 --> 00:26:20,000

uh

727

00:26:25,190 --> 00:26:22,480

ocean linings

728

00:26:27,510 --> 00:26:25,200

and then over time we do want to as we

729

00:26:29,510 --> 00:26:27,520

refine the performance of the rocket um

730

00:26:32,470 --> 00:26:29,520

and it can improve the

731

00:26:34,070 --> 00:26:32,480

just all the elements of flight um

732

00:26:35,990 --> 00:26:34,080

and it's it's amazing how sort of a few

733

00:26:38,149 --> 00:26:36,000

percent improvement here and there sort

734

00:26:39,830 --> 00:26:38,159

of adds up and and then you're able to

735

00:26:41,430 --> 00:26:39,840

achieve enough margin to bring it all

736

00:26:43,909 --> 00:26:41,440

the way back to land so we're hopeful

737

00:26:45,430 --> 00:26:43,919

that in the long run we'll move from say

738

00:26:48,789 --> 00:26:45,440

half of our missions being ocean landing

739

00:26:50,630 --> 00:26:48,799

to to maybe a third of them or or a

740

00:26:52,630 --> 00:26:50,640

quarter

741

00:26:54,549 --> 00:26:52,640

because it certainly is um a lot easier

742

00:26:55,350 --> 00:26:54,559

to re-fly the rock if it comes back to

743

00:26:56,710 --> 00:26:55,360

land

744

00:26:59,830 --> 00:26:56,720

um

745

00:27:01,350 --> 00:26:59,840

question uh

746

00:27:02,630 --> 00:27:01,360

uh just so i went in when's the next

747

00:27:05,350 --> 00:27:02,640

lane

748

00:27:07,830 --> 00:27:06,710

the next line lining i think it's uh

749

00:27:10,470 --> 00:27:07,840

probably

750

00:27:13,110 --> 00:27:10,480

uh about three months away

751
00:27:14,070 --> 00:27:13,120
so the next one's another another ocean

752
00:27:16,070 --> 00:27:14,080
landing

753
00:27:21,029 --> 00:27:16,080
um

754
00:27:24,149 --> 00:27:22,149
yeah yeah i think that's probably the

755
00:27:25,909 --> 00:27:24,159
most likely

756
00:27:28,230 --> 00:27:25,919
yeah so probably the

757
00:27:30,470 --> 00:27:28,240
the third mission from now will be

758
00:27:33,590 --> 00:27:30,480
a land landing

759
00:27:35,830 --> 00:27:33,600
and uh the next two are

760
00:27:37,190 --> 00:27:35,840
high velocity geo emissions

761
00:27:38,789 --> 00:27:37,200
so these will be

762
00:27:40,630 --> 00:27:38,799
uh

763
00:27:43,350 --> 00:27:40,640

quite tough shift landings because it's

764

00:27:44,870 --> 00:27:43,360

going to come in really hot

765

00:27:46,549 --> 00:27:44,880

in fact the

766

00:27:48,630 --> 00:27:46,559

the thing about the high velocity

767

00:27:49,990 --> 00:27:48,640

re-entries is that they're not just it's

768

00:27:51,590 --> 00:27:50,000

not just a lot of wind force but it's a

769

00:27:53,510 --> 00:27:51,600

lot of heat

770

00:27:55,750 --> 00:27:53,520

and that the heat goes peak heating goes

771

00:27:56,789 --> 00:27:55,760

with the cube of velocity

772

00:27:57,830 --> 00:27:56,799

so

773

00:27:59,029 --> 00:27:57,840

um

774

00:28:01,029 --> 00:27:59,039

like the way to understand the

775

00:28:02,310 --> 00:28:01,039

difficulty of achieving a given velocity

776

00:28:04,230 --> 00:28:02,320

is actually as the square because the

777

00:28:05,830 --> 00:28:04,240

kinetic energy grows as the square of

778

00:28:07,510 --> 00:28:05,840

velocity

779

00:28:10,230 --> 00:28:07,520

but then that the peak heating goes

780

00:28:11,510 --> 00:28:10,240

grows as the cube of velocity so

781

00:28:13,669 --> 00:28:11,520

it's really

782

00:28:15,430 --> 00:28:13,679

wants to melt

783

00:28:17,590 --> 00:28:15,440

you think we've got a question on social

784

00:28:19,830 --> 00:28:17,600

media can you give us that one

785

00:28:21,590 --> 00:28:19,840

sure um we have a lot of questions on

786

00:28:23,590 --> 00:28:21,600

social media this one's from nasa watch

787

00:28:25,990 --> 00:28:23,600

and he wants to know how many times do

788

00:28:27,830 --> 00:28:26,000

you think you can reuse a used first

789

00:28:29,590 --> 00:28:27,840

stage

790

00:28:31,909 --> 00:28:29,600

um i think

791

00:28:33,430 --> 00:28:31,919

some some aspects of the stage will have

792

00:28:35,990 --> 00:28:33,440

no meaningful

793

00:28:37,110 --> 00:28:36,000

life i mean they'll meaning that they'll

794

00:28:39,669 --> 00:28:37,120

you could probably do them a thousand

795

00:28:41,269 --> 00:28:39,679

missions um

796

00:28:43,669 --> 00:28:41,279

i think almost everything on the stage

797

00:28:46,630 --> 00:28:43,679

will be good for

798

00:28:47,909 --> 00:28:46,640

10 or 20 missions

799

00:28:49,350 --> 00:28:47,919

and

800

00:28:53,269 --> 00:28:49,360

with minor refurbishment you could get

801

00:28:57,510 --> 00:28:55,269

this one is from bart

802

00:28:58,870 --> 00:28:57,520

on twitter and they ask can you

803

00:29:00,070 --> 00:28:58,880

um this might be for the nasa folks can

804

00:29:02,630 --> 00:29:00,080

you talk about the schedule for the

805

00:29:03,990 --> 00:29:02,640

upcoming beam deployment on iss

806

00:29:06,230 --> 00:29:04,000

i don't know first

807

00:29:08,630 --> 00:29:06,240

sure um so beam's going to be installed

808

00:29:11,190 --> 00:29:08,640

we're thinking about the 15th or 16th of

809

00:29:12,630 --> 00:29:11,200

this month so relatively quickly after a

810

00:29:14,149 --> 00:29:12,640

dragon arrives

811

00:29:16,310 --> 00:29:14,159

there's a certain period for thermal

812

00:29:18,470 --> 00:29:16,320

stabilization once it arrives

813

00:29:20,149 --> 00:29:18,480

and and then inflation is probably not

814

00:29:23,430 --> 00:29:20,159

until the end of may somewhere around

815

00:29:24,870 --> 00:29:23,440

the 25th 26th of may

816

00:29:26,549 --> 00:29:24,880

there's a lot of work involved in

817

00:29:28,470 --> 00:29:26,559

preparing for that and

818

00:29:29,909 --> 00:29:28,480

and we also want a a good quiescent

819

00:29:32,310 --> 00:29:29,919

period on board international space

820

00:29:34,310 --> 00:29:32,320

station uh as i mentioned earlier this

821

00:29:36,710 --> 00:29:34,320

is we've had four visiting vehicles uh

822

00:29:38,470 --> 00:29:36,720

this will be the fourth in four weeks so

823

00:29:40,310 --> 00:29:38,480

uh we need a time when vehicles aren't

824

00:29:41,110 --> 00:29:40,320

coming and going it turns out there's a

825

00:29:43,269 --> 00:29:41,120

high

826

00:29:44,870 --> 00:29:43,279

sun angle in the end of may which

827

00:29:46,310 --> 00:29:44,880

vehicles can't come and go during that

828

00:29:48,549 --> 00:29:46,320

time and so it'll be a great time to

829

00:29:51,510 --> 00:29:48,559

inflate beams so we're expecting expect

830

00:29:54,310 --> 00:29:51,520

about the 25th or 6th of may for

831

00:29:58,470 --> 00:29:54,320

inflation and like i said tax day for

832

00:30:09,430 --> 00:29:59,830

okay let's come up here and take a

833

00:30:14,549 --> 00:30:12,389

hi daddy cesar with the utica phoenix

834

00:30:16,549 --> 00:30:14,559

and for elon i was wondering if you

835

00:30:18,310 --> 00:30:16,559

foresee any competing launch providers

836

00:30:19,669 --> 00:30:18,320

following suit with reliable or

837

00:30:22,870 --> 00:30:19,679

reusability

838

00:30:24,710 --> 00:30:22,880

and was that a hope of yours it is and

839

00:30:28,549 --> 00:30:24,720

what kind of edge does reusability give

840

00:30:31,909 --> 00:30:29,990

i think

841

00:30:33,190 --> 00:30:31,919

i i'm hopeful that

842

00:30:37,430 --> 00:30:33,200

the

843

00:30:38,710 --> 00:30:37,440

direction of reusability um

844

00:30:40,470 --> 00:30:38,720

i think it's it's quite it's quite

845

00:30:42,470 --> 00:30:40,480

fundamental i mean

846

00:30:44,789 --> 00:30:42,480

it's just as fundamental in rocketry as

847

00:30:47,750 --> 00:30:44,799

it is in other forms of transport

848

00:30:50,310 --> 00:30:47,760

such as cars or planes or

849

00:30:51,110 --> 00:30:50,320

bicycles or anything

850

00:30:55,990 --> 00:30:51,120

the

851
00:30:57,269 --> 00:30:56,000
or reload it's actually mostly oxygen on

852
00:30:59,029 --> 00:30:57,279
board

853
00:31:01,269 --> 00:30:59,039
is only about

854
00:31:02,950 --> 00:31:01,279
uh two to three hundred thousand dollars

855
00:31:05,029 --> 00:31:02,960
but the cost the rocket itself is 60

856
00:31:06,549 --> 00:31:05,039
million you know it's kind of like a an

857
00:31:08,630 --> 00:31:06,559
aircraft um

858
00:31:11,509 --> 00:31:08,640
aircraft are real expensive but not to

859
00:31:13,750 --> 00:31:11,519
buy to construct and and buy but not

860
00:31:14,789 --> 00:31:13,760
expensive to refuel relatively speaking

861
00:31:16,230 --> 00:31:14,799
so

862
00:31:17,430 --> 00:31:16,240
um

863
00:31:19,750 --> 00:31:17,440

so it's really quite fundamental like

864

00:31:21,190 --> 00:31:19,760

the the potential if you've got a a

865

00:31:24,389 --> 00:31:21,200

rocket that can be

866

00:31:26,149 --> 00:31:24,399

uh fully and rapidly reused um it's

867

00:31:28,230 --> 00:31:26,159

somewhere in the order of 100 fold cost

868

00:31:29,830 --> 00:31:28,240

reduction

869

00:31:32,389 --> 00:31:29,840

in marginal cost you still have your

870

00:31:40,149 --> 00:31:32,399

fixed cost but in marginal cost it's a

871

00:31:44,630 --> 00:31:42,789

drainy mom with cnn this is for mr musk

872

00:31:45,990 --> 00:31:44,640

congratulations and

873

00:31:48,630 --> 00:31:46,000

is there anything that you and your

874

00:31:53,590 --> 00:31:48,640

companies are working on that can top

875

00:31:53,600 --> 00:31:57,509

listen

876

00:32:02,789 --> 00:32:01,029

this is a good one for sure um

877

00:32:04,310 --> 00:32:02,799

i think um

878

00:32:06,149 --> 00:32:04,320

yeah i mean i i don't know about joan's

879

00:32:08,950 --> 00:32:06,159

but i mean like i think that getting to

880

00:32:12,230 --> 00:32:08,960

orbit for the first time yeah was uh

881

00:32:13,350 --> 00:32:12,240

i mean that was probably the best one um

882

00:32:15,669 --> 00:32:13,360

um

883

00:32:17,830 --> 00:32:15,679

way we're up through 2008 we managed to

884

00:32:18,710 --> 00:32:17,840

do three launches but they they failed

885

00:32:20,549 --> 00:32:18,720

um

886

00:32:22,389 --> 00:32:20,559

and i actually only had the money for

887

00:32:24,230 --> 00:32:22,399

for three launches but we managed to

888

00:32:25,590 --> 00:32:24,240

that was the original plan of the world

889

00:32:26,710 --> 00:32:25,600

after three if we haven't succeeded

890

00:32:29,269 --> 00:32:26,720

we'll

891

00:32:31,830 --> 00:32:29,279

you know maybe that that that should be

892

00:32:34,230 --> 00:32:31,840

that that's it um but we managed to

893

00:32:37,269 --> 00:32:34,240

scramble and put together the parts for

894

00:32:38,389 --> 00:32:37,279

one one final launch and and it worked

895

00:32:41,190 --> 00:32:38,399

um

896

00:32:43,430 --> 00:32:41,200

so that launch four of falcon one was

897

00:32:45,990 --> 00:32:43,440

i think the most profound

898

00:32:47,750 --> 00:32:46,000

um and then

899

00:32:48,870 --> 00:32:47,760

and then you know first launched falcon

900

00:32:50,470 --> 00:32:48,880

9

901
00:32:52,710 --> 00:32:50,480
first one's dragon

902
00:32:54,950 --> 00:32:52,720
bringing dragon back

903
00:32:56,950 --> 00:32:54,960
landing back at the cape um i'd say for

904
00:32:58,630 --> 00:32:56,960
landing landing back the cape was

905
00:33:02,149 --> 00:32:58,640
next best after just getting to orbit in

906
00:33:04,870 --> 00:33:02,159
the first place yeah absolutely

907
00:33:06,310 --> 00:33:04,880
um and push for s4 things in the future

908
00:33:08,870 --> 00:33:06,320
um

909
00:33:11,669 --> 00:33:08,880
we i think we'll we'll be successful

910
00:33:12,950 --> 00:33:11,679
ironically when it becomes boring

911
00:33:15,990 --> 00:33:12,960
um

912
00:33:18,789 --> 00:33:17,350
so when it's like oh yeah another

913
00:33:21,350 --> 00:33:18,799

landing okay

914

00:33:23,029 --> 00:33:21,360

uh no news there that's um

915

00:33:24,470 --> 00:33:23,039

that's that's actually when it will be

916

00:33:25,509 --> 00:33:24,480

successful

917

00:33:28,710 --> 00:33:25,519

um

918

00:33:29,909 --> 00:33:28,720

you know there's still this little you

919

00:33:30,950 --> 00:33:29,919

know few more things you want to do and

920

00:33:34,870 --> 00:33:30,960

try to

921

00:33:36,230 --> 00:33:34,880

bring the fairing the big nose cone back

922

00:33:37,430 --> 00:33:36,240

and

923

00:33:39,590 --> 00:33:37,440

that that'll certainly help because

924

00:33:40,710 --> 00:33:39,600

those each of those cost several million

925

00:33:44,630 --> 00:33:40,720

um

926
00:33:46,149 --> 00:33:44,640
you know falcon heavy should be quite

927
00:33:47,029 --> 00:33:46,159
exciting

928
00:33:51,110 --> 00:33:47,039
um

929
00:33:51,120 --> 00:33:55,509
okay let's take a question right here

930
00:34:01,350 --> 00:33:58,230
mark gotch historical space imagery

931
00:34:04,230 --> 00:34:01,360
elon congratulations uh once again you

932
00:34:07,029 --> 00:34:04,240
have proved to the world that you can

933
00:34:07,909 --> 00:34:07,039
land your rockets whether it be on land

934
00:34:10,629 --> 00:34:07,919
or

935
00:34:13,430 --> 00:34:10,639
on a drone ship on the water

936
00:34:16,470 --> 00:34:13,440
but looking forward to this future

937
00:34:19,270 --> 00:34:16,480
looking at your rockets being

938
00:34:22,869 --> 00:34:19,280

recovered and being reusable

939

00:34:25,669 --> 00:34:22,879

looking at your success with the dragon

940

00:34:28,069 --> 00:34:25,679

capsule in terms of its abort test

941

00:34:29,589 --> 00:34:28,079

protecting astronauts lives for the

942

00:34:31,909 --> 00:34:29,599

future

943

00:34:33,270 --> 00:34:31,919

looking at coupling that with your

944

00:34:36,710 --> 00:34:33,280

rockets

945

00:34:40,629 --> 00:34:36,720

we see the foreseeable future of manned

946

00:34:43,750 --> 00:34:40,639

space flight at a very economical rate

947

00:34:47,109 --> 00:34:43,760

can you tell me you pursuing more

948

00:34:50,710 --> 00:34:47,119

landings on water versus land

949

00:34:54,149 --> 00:34:50,720

when will you begin to go forward to

950

00:34:56,629 --> 00:34:54,159

your future of manned space flight

951
00:34:58,950 --> 00:34:56,639
well the the first uh

952
00:35:01,190 --> 00:34:58,960
test flights with with astronauts

953
00:35:02,870 --> 00:35:01,200
working with nasa hopefully

954
00:35:05,670 --> 00:35:02,880
that first flight will occur towards the

955
00:35:09,510 --> 00:35:07,430
and uh so that's going to be real

956
00:35:12,470 --> 00:35:09,520
exciting um we're nearing the completion

957
00:35:14,630 --> 00:35:12,480
of dragon 2

958
00:35:16,470 --> 00:35:14,640
and we'll um we'll first do an unmanned

959
00:35:17,270 --> 00:35:16,480
test flight and then

960
00:35:20,310 --> 00:35:17,280
uh

961
00:35:23,430 --> 00:35:22,390
and we obviously want to be super

962
00:35:25,589 --> 00:35:23,440
careful

963
00:35:28,790 --> 00:35:25,599

and make sure that things are

964

00:35:31,349 --> 00:35:28,800

as safe as it possibly can be

965

00:35:33,589 --> 00:35:31,359

but yeah it could be as soon as uh next

966

00:35:35,430 --> 00:35:33,599

year that that we do the first crude

967

00:35:37,190 --> 00:35:35,440

space flight um

968

00:35:38,069 --> 00:35:37,200

and you know i just also just like take

969

00:35:39,670 --> 00:35:38,079

uh

970

00:35:41,510 --> 00:35:39,680

a moment um

971

00:35:44,630 --> 00:35:41,520

you know i the

972

00:35:46,310 --> 00:35:44,640

spacex has got five five thousand people

973

00:35:48,150 --> 00:35:46,320

and um

974

00:35:55,750 --> 00:35:48,160

i get a lot of attention but

975

00:36:00,310 --> 00:35:57,670

as you say you couldn't have done any of

976

00:36:03,270 --> 00:36:00,320

this without your dedicated people yeah

977

00:36:05,109 --> 00:36:03,280

so awesome team thank you sir thank you

978

00:36:07,270 --> 00:36:05,119

all right let's uh take a couple on the

979

00:36:08,870 --> 00:36:07,280

phone here chris ryan for the chris

980

00:36:15,990 --> 00:36:08,880

davenport from the washington post i

981

00:36:16,000 --> 00:36:23,190

mr davenport your line is open

982

00:36:23,200 --> 00:36:28,870

all right uh any others on the phone

983

00:36:28,880 --> 00:36:34,950

okay ryan ruggiero

984

00:36:34,960 --> 00:36:42,069

mr ruggiero your line is open

985

00:36:45,030 --> 00:36:43,430

all right let's come back here we'll

986

00:36:46,870 --> 00:36:45,040

take about two more questions and

987

00:36:49,670 --> 00:36:46,880

that'll wrap us up

988

00:36:54,069 --> 00:36:49,680

anymore over here

989

00:36:55,829 --> 00:36:54,079

all right well we got one over here

990

00:36:58,790 --> 00:36:55,839

um robin c mango with the new york

991

00:36:59,990 --> 00:36:58,800

observer um elon you always uh mentioned

992

00:37:02,390 --> 00:37:00,000

that

993

00:37:04,470 --> 00:37:02,400

reusable rockets is uh the long-term

994

00:37:07,270 --> 00:37:04,480

goal of that is to make colonization on

995

00:37:08,630 --> 00:37:07,280

mars cheaper and sustainable can you

996

00:37:11,270 --> 00:37:08,640

give us an update

997

00:37:14,390 --> 00:37:11,280

uh on mars and the company's plans

998

00:37:18,550 --> 00:37:16,150

well i think probably

999

00:37:20,150 --> 00:37:18,560

um you know now is not not the time to

1000

00:37:22,550 --> 00:37:20,160

give give a

1001
00:37:24,470 --> 00:37:22,560
sort of full update um i am planning on

1002
00:37:26,069 --> 00:37:24,480
giving a talk at the international

1003
00:37:28,150 --> 00:37:26,079
astronautical congress which will be in

1004
00:37:29,430 --> 00:37:28,160
mexico this year in september

1005
00:37:32,230 --> 00:37:29,440
and um

1006
00:37:34,230 --> 00:37:32,240
i thought that would be a good venue to

1007
00:37:36,230 --> 00:37:34,240
describe what we think would be a good

1008
00:37:38,470 --> 00:37:36,240
approach something that would would be

1009
00:37:40,230 --> 00:37:38,480
effective for establishing

1010
00:37:43,270 --> 00:37:40,240
a city on mars

1011
00:37:48,069 --> 00:37:43,280
i think it's going to sound pretty crazy

1012
00:37:51,589 --> 00:37:49,270
all right with that we're going to wrap

1013
00:37:54,550 --> 00:37:51,599

up our large coverage here for spacex

1014

00:37:55,510 --> 00:37:54,560

crs-8 and hopefully you look forward to

1015

00:37:57,510 --> 00:37:55,520

our

1016

00:37:59,589 --> 00:37:57,520

grapple coverage coming up on sunday